

US EPA APPCD Metrology Lab

Flow Rate Calibration Report

Device Under Test	Archer Personal Sampler	Calibration Date	5/13/2010
Mfr., Model	SKC, PCXR8	Location	Remote
Serial Number	538068	Notebook, page	2113, p. 100
Met. Lab ID	03566	Ambient Conditions During Calibration Temperature between 21 °C and 25 °C RH between 40 % and 70 % Pressure between 1,009 hPa and 1,015 hPa	
Affiliation & PI	IEMB, Zhishi Guo		
Requestor	Zhishi Guo		
Report File	Sampler 03566 2010-05-13 qa.xls		
MOP #			

Comments

The correlation for this calibration was between sampler flow rate indicated by the rotameter and flow rate measured with a gilibrator. Data was collected at the low, mid, and high level for the sampler. Sampler flow rate was then set to deliver a volumetric flow rate of approximately 4.5 LPM.

As left rotameter setting: 5.2 LPM, equivalent flow rate 4.49 LPM

Correction Equations and Uncertainty

Use the equation format below to correct a device response or determine the device setting.

$$y = m * x + b$$

Coefficients for correcting a device reading, y = corrected reading (LPM) and x = device reading (LPM)

$$m = 0.888, b = -0.09$$

Coefficients for determining a device setting, y = device setting (LPM) and x = desired quantity (LPM)

$$m = 1.125, b = 0.11$$

Correction equations were derived from least squared methods and will reduce systematic bias from DUT measurements.

Combined Expanded Uncertainty for this calibration was ± 0.1 LPM.

Combined Expanded Uncertainty includes the random errors after correction, DUT resolution, and the uncertainty of the reference devices. It is expressed at a coverage factor of 2 representing a confidence interval of approximately 95%.

Test Equipment

Device	Calibration Due	SN	Uncertainty (2K)
Gilibrator, 20cc - 6 L/min	9/30/2010	19072-S	$\pm 1.0\%$ of reading

Calibrated by Sam Brubaker _____ Reviewed by Mike Tufts _____

Measurement Results

DUT Name Archer Personal Sampler
MetLab ID 03566
Calibration Date 5/13/2010

DUT Response, LPM	Reference Measurement, LPM	Corrected DUT Reading, LPM	DUT Error after Correction LPM	DUT Error before Correction LPM
1.5	1.25	1.2	0.0	0.3
1.5	1.25	1.2	0.0	0.3
1.5	1.23	1.2	0.0	0.3
1.5	1.25	1.2	0.0	0.3
1.5	1.23	1.2	0.0	0.3
1.5	1.23	1.2	0.0	0.3
1.5	1.23	1.2	0.0	0.3
1.5	1.23	1.2	0.0	0.3
1.5	1.23	1.2	0.0	0.3
1.5	1.23	1.2	0.0	0.3
3.0	2.56	2.6	0.0	0.4
3.0	2.57	2.6	0.0	0.4
3.0	2.57	2.6	0.0	0.4
3.0	2.57	2.6	0.0	0.4
3.0	2.56	2.6	0.0	0.4
3.0	2.56	2.6	0.0	0.4
3.0	2.56	2.6	0.0	0.4
3.0	2.56	2.6	0.0	0.4
3.0	2.56	2.6	0.0	0.4
3.0	2.57	2.6	0.0	0.4
3.0	2.56	2.6	0.0	0.4
4.5	3.95	3.9	0.0	0.6
4.5	3.96	3.9	-0.1	0.5
4.5	3.95	3.9	0.0	0.6
4.5	3.94	3.9	0.0	0.6
4.5	3.95	3.9	0.0	0.5
4.5	3.93	3.9	0.0	0.6
4.5	3.95	3.9	0.0	0.5
4.5	3.96	3.9	-0.1	0.5
4.5	3.96	3.9	-0.1	0.5
4.5	3.96	3.9	-0.1	0.5
5.2	4.48	4.5	0.0	0.7
5.2	4.49	4.5	0.0	0.7
5.2	4.49	4.5	0.0	0.7
5.2	4.50	4.5	0.0	0.7
5.2	4.50	4.5	0.0	0.7
5.2	4.48	4.5	0.0	0.7
5.2	4.50	4.5	0.0	0.7
5.2	4.48	4.5	0.0	0.7
5.2	4.49	4.5	0.0	0.7
5.2	4.50	4.5	0.0	0.7

Error Chart
Archer Personal Sampler
MetLab ID 03565
5/13/2010

